Procedia Engineering, 2017, vol.206, pages 1087-1092

Mathematical Model for Assessing the Accuracy of Processed Gears on Gear Shaping Machines

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Abstract

© 2017 The Authors. Published by Elsevier Ltd. This paper examines the impact of the geometric and kinematic errors of gear shaping machines for the accuracy of processed wheels. There is a problem to establish a correlation between the errors of the technological system with the gear accuracy parameters defined by standards. In this article, the equation of the machined surface is proposed based on the coordinate transformation matrices and equations of involute surface of the tool in the form of a matrix equation. On the basis of this equation the machine output precision is given in the form of matrix equation. The impact of errors of the technological system elements is displayed by a matrix of variations, components of which are the projection of errors on the axis. Output errors are applied on the machined surface via the projection on the line of action. Next, the obtained values are translated into a standardized deviation of the gear accuracy. This enables forecasting the possibility of obtaining the products of certain accuracy on this machine, as well as to control the specific parameters of the technological system to ensure the accuracy and stability of the process.

http://dx.doi.org/10.1016/j.proeng.2017.10.599

Keywords

gear accuracy, gear shaping machine, geometric accuracy

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